SECTION 16110
RACEWAYS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Conduit runs are diagrammatic. Verify locations in field.

1.2 SUBMITTALS

A. Product data:
   1. Sealers.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Acceptable manufacturers:
   1. Steel conduit:
      a. Base:
         1) Allied Tube & Conduit.
         2) LTV Conduit.
         3) Republic Steel Corporation.
         4) Triangle Wire & Cable.
         5) Wheatland Tube.
   2. PVC coated steel conduit:
      a. Base:
         1) Robroy Industries.
         2) Occidental Coating.
         3) Schuller International.
   3. Neoprene coated flexible steel conduit:
      a. Base:
         1) Anaconda.
         2) Electri-Flex.
         3) Kellems.
   4. PVC conduit:
      a. Base:
         1) Carlon Electrical Products.
         2) Ethyl.
         3) Cantex.
         4) Condux.
   5. Wireway:
      a. Base:
         1) Hoffman Engineering.
         2) Square D.
         3) Wiremold Co.
   6. Hangers for joint between precast units:
      a. Base:
         1) Fehr Brothers.
         2) Heckmann Building Products.
         3) Dayton Superior.
   7. Other manufacturers desiring approval comply with Document 00440.

B. Conduit:
   1. Rigid steel conduit: Hot dipped, sherardized or galvanized after fabrication.
   2. Intermediate metal conduit (IMC): Galvanized steel.
   3. Thinwall electrical metallic tubing (EMT): Galvanized steel.
   4. Flexible steel conduit for motor and equipment connections: Galvanized with continuous copper content or separate grounding conductor.
      a. Neoprene-coated type: With approved liquid-tight connectors; Anaconda Seal-Tite type LIA.
   5. Rigid PVC conduit: High impact polyvinyl chloride, meeting minimum requirements of NEC.
      a. Direct burial type: Carlon Electric Products, Type 40.
      b. Concrete encased burial type: Carlon Electric Products, Type EB.
      c. Mark each length clearly and durably with nominal trade size, type of material, and UL label.
      d. Fittings: PVC, solvent weld type, with connectors and threaded adapters as required.
   6. Stamp each length with name or trade mark of manufacturer and affix UL label.
   7. PVC coated steel conduit: Galvanized rigid steel conduit with 40 mils minimum coating of PVC.

C. Wireway: NEMA I lay-in wire-way of size indicated.
   1. Arrange wireway cover for removal, hinging and locking closed by captive type fasteners.
   2. Finish: Gray baked-enamel, over phosphatized surfaces.
   3. With necessary fittings, with or without knockouts, with solid cover where passing through partitions, with manufacturer's name or trademark visible after installation.
   4. Designed for continuous grounding.

2.2 SUPPORTS, SLEEVES AND SEALS

A. Conduit hangers - General: Threaded rods, with straps or clamp conduit holder.
   1. Do not use the following to support conduit:
      a. Wire including ceiling support wires.
      b. Perforated strap hangers.
      c. Plastic or nylon tie wraps.
   2. Use trapeze assemblies for multiple conduits.
   3. Provide sufficient hangers for support of electrical work and equipment to limit load on single hanger to 25 LB, maximum; space not over 8 FT OC.
   4. Hangers in metal roof deck: Do not extend above tops of ribs, or otherwise interfere with vapor retarder, insulation or roofing.

B. Hanger fasteners: Provide inserts or fasteners to attach hangers to structure.
   1. Attachment to metal roof deck may be by means of prepunched tabs, prepunched holes, or with screws in sides of ribs or toggle bolts in bottom of ribs.
   2. Do not use concrete nails in masonry walls.

C. Sleeves: Black iron pipe, RGS or IMC sized to accommodate work passing through.

D. Sealer for sleeves and openings around conduit: UL listed for assembly. See Section 07270.

E. All penetrations of floor slab at mechanical rooms above grade shall be sealed off and waterproofed.

2.3 SCHEDULE OF CONDUIT APPLICATIONS

A. Use rigid steel conduit or intermediate metal conduit in following locations:
   1. Underground.
   2. Outdoors.
   3. In concrete.
   4. Under concrete slabs on grade.
   5. In exterior masonry walls.

6. In wet locations.
7. For exposed runs below 10 FT above finished floor unless otherwise indicated.

B. Use PVC coated steel conduit in corrosive areas as noted.

C. Thinwall EMT may be used for other 600 volt and below indoor dry applications.

D. Exposed EMT may be used directly above panelboards and other equipment with installed height of 6 FT or more above floor.

E. PVC conduit may be used only as follows:
1. Exterior lighting: See Section 16530.
2. Underground distribution: See Section 16375.
3. 45 degree and greater bends in PVC conduit runs shall be made with rigid steel conduit.

F. Use no conduit smaller than 1/2 IN.
a. Size conduit in accordance with NEC unless indicated larger.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. Install all conduits concealed within walls, floors and above finished ceilings.

B. Exposed overhead conduit may be used in mechanical, electrical and other equipment rooms except conduit drops to the following:
1. Wiring devices.
2. Fire alarm pull stations.
3. Telephone outlets.

C. Run exposed conduit in straight lines at right angles to or parallel with walls, beams or columns.

D. Keep conduit away from waterlines or heating duct lines. Where crossings are unavoidable, leave minimum 6 IN clearance.

E. Do not cross conduit in front of access door in HVAC duct.

F. Install no conduit larger than 3/4 IN in floor slabs or concrete columns. Do not install multiple conduits in a single concrete column without Government's approval.
1. Where installed in composite floors, conduit runs shall have no crossovers.
2. Do not install conduit under pads for fans, pumps, or other machinery.

3.2 UNDERGROUND INSTALLATIONS

A. Encase underground PVC conduits in 2 IN minimum of concrete where passing under roadways.

B. Steel conduits in contact with earth or a vapor retarder, that are not completely encased in concrete: Coat with 2 coats asphaltum before installation, or use PVC coated steel conduit.

C. Install underground conduit 30 IN minimum below grade. Do not backfill before observation by Engineer. Concrete encasements: Provide 30 IN of cover.

D. Where direct burial cable is specified for outdoor circuits, use O-Z type "CRC" terminators on underground rigid conduit for entering buildings. Extend conduit 2 FT minimum beyond building.

3.3 CONDUIT INSTALLATION

A. Support all conduit systems from building structure or walls with approved hangers.
1. Do not support from piping, ducts or support systems for piping or ducts.
2. Do not install to prevent ready removal of equipment, piping, ducts or ceiling tiles.
3. Do not support from ceiling or ceiling support systems.

B. Sum of angles in any conduit run shall not exceed 360 degrees.
   1. Where more bends are necessary, install condulet or pullbox.
   2. A hand conduit bender may be used on 1/2 IN and 3/4 IN RGS, IMC or EMT conduit and 1 IN EMT conduit. Use a conduit bending machine for larger sizes.

C. Make joints in threaded conduit watertight with white nonleaded compound applied to male threads only.
   1. Cut square, ream smooth, and properly thread field joints to receive couplings.
   2. Do not use running threads.

D. Fit all conduit ends at switch and outlet boxes with approved lock nuts and bushing forming approved tight bond with box when screwed tightly in place.

E. Remove moisture and debris from conduit before wire is drawn into place. Tightly plug ends of conduit with tapered wood plugs or plastic inserts until wire is pulled.

F. Neatly seal openings around conduits, etc., where they pass through fire rated construction or exterior walls or roof.

3.4 CONNECTIONS AND FITTINGS

A. Above lay-in tile ceilings, make connections to lay-in type fixtures with 3/8 or 1/2 IN x 6 FT long flexible steel conduit.
   1. Include No.18 branch and grounding conductors.
   2. Arrange conduit and box systems for easy removal of lay-in ceiling.

B. Connect switch legs for narrow switches in hollow metal jamb posts using 1/2 IN flexible steel conduit.
   1. Use neoprene coated type with liquid tight connectors in damp locations.
   2. Damp locations include: Mechanical equipment pumps on or below grade and exterior applications.

C. Make all motor and equipment connections with neoprene coated flexible steel conduit not exceeding 24 IN length, with liquid-tight connectors at both ends.

D. Install expansion joint fittings on conduit at all building expansion joints where conduit is in slab, rigidly attached to structure, or where otherwise necessary to compensate for thermal expansion and contraction.

E. Use sealing fittings on rigid galvanized conduit in hazardous areas. Install in accordance with NEC.

F. Use sealing fittings on refrigeration and freezer room conduit runs in accordance with NEC.

G. Install conduit to roof exhaust fans through fan housing with no conduit exposed.

H. Install conduit stub-ups terminating 6 IN above corridor lift out ceiling. Terminate conduit with insulating bushing.

END OF SECTION